

To: File  
From: Laura Rowe, Assistant Counsel  
Re: SEQRA Review for Agreement #110960  
Date: July 11, 2017

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Under Agreement #110960 with Brookhaven National Lab, NYSERDA will be providing Brookhaven with \$25 million to fund the Brookhaven High Energy X-Ray (HEX) Beamline experimental station at the National Synchrotron Light Source 2 (NSLS-II) located at Brookhaven National lab. The HEX contract will provide funds for the design, specification, construction and installation of the necessary equipment for a fully functional beamline dedicated to using high energy x-rays to understand energy related materials and devices.

The work being performed under the Agreement falls under the 2006 Environmental Assessment for the National Synchrotron Light Source-II (NSLS-II) performed by Brookhaven National Lab in October 2006. Under this Environmental Assessment, there was a Finding of No Significant Impact under the National Environmental Policy Act of 1969 and an Environmental Impact Statement was not required.

Brookhaven stated that the work being performed under the NYSERDA Agreement: (A) utilizes existing controls and procedures; (b) is similar to research previously performed at BNL; (C) utilizes existing facilities/equipment; and that (D) BNL processes and procedures exist to manage waste generation/disposal. In addition to falling under the October 2006 Environmental Assessment for NSLS-II, DOE/EA-1558, BNL further stated that the proposed actions being taken under the NYSERDA Agreement fall within the scope of a July 2012 Generic WFO/CRADA/PIQ BNL-520 categorical exclusion

After discussing this Agreement with the BNL attorney and their NEPA point person and contracts administrator, it was determined that the actions being taken under the Agreement similarly meet a Type II Action under the State Environmental Quality Review Act (SEQRA).

The NSLS-II X-ray source built at the Brookhaven National Laboratory is one of the most ambitious projects undertaken by DOE. The NSLS-II, completed in 2015, is the world's most powerful photon microscope for high-impact, discovery-class science and technology. Capabilities at NSLS-II enable researchers to perform spectroscopic analyses of individual atoms and use high-powered x-rays to observe how materials in systems, such as batteries, operate under real working conditions. NSLS-II will enable the study of material properties and functions with nanoscale resolution and will provide world-leading capabilities for x-ray imaging and high-resolution energy analysis. The fundamental objective of this NYSERDA project is to construct a HEX beamline at BNL to advance energy storage technologies. Researchers will be able to map the three-dimensional structure of clean energy technologies including energy storage materials in real time and under actual operating conditions.

The HEX Agreement will provide funds for the design, specification, construction and installation of the necessary equipment for a fully functional beamline dedicated to using high energy x-rays to understand energy related materials and devices. The work being performed under the Agreement appears to meet the following Type II Actions listed in SEQRA: 503.3(p)

conducting pilot- or bench-scale laboratory research and analyses in which all products and byproducts can be adequately disposed of through the existing laboratory's solid waste disposal, ventilation, and sewage treatment systems; 503.3(n) collecting, organizing, and analyzing information, including basic data collection and research, masterplan study components, water quality or pollution studies, traffic counts, engineering studies, boring studies, surveys, or soils that do not commit the authority to undertake, fund, or approve any Type I or unlisted action; 503.3(a)(18) design, laboratory testing, construction, installation, or demonstration of minor new devices, instrumentation, or equipment, but not including the construction of towers, for measuring or monitoring the performance of an operation, process, or system or to support remote or wireless communication; 617.5(7) construction or expansion of a primary or accessory/appurtenant, nonresidential structure or facility involving less than 4,000 square feet of gross floor area and not involving a change in zoning or a use variance and consistent with local land use controls, but not radio communication or microwave transmission facilities.

In the BNL Finding of No Significant Impact for the construction of NSLS-II, one environmental impact that is raised is radiological impacts which is not clearly a Type II under SEQRA. I discussed this impact with the BNL attorneys and staff, as indicated in the attached e-mail. They provided that the NSLS-II is a 3.0 Giga-electron volt (GeV) electron storage ring that is designed to operate in top-off mode, thus providing an electron source of nearly constant current in the storage ring. This state-of-the-art facility has the capacity to investigate materials at 1-nanometer (nm) spatial resolution and 0.1-milli-electron volt (meV) energy resolutions, which is equivalent to the spectroscopy of a single atom. The NSLS-II is operated 24 hours a day, seven days a week, for approximately 5000 hours per year. Ionizing radiation hazards include prompt radiation (neutrons, bremsstrahlung and x-rays) produced during normal NSLS-II accelerator operations. The primary source of radiation exposure is created by electron beam losses during operation of the accelerators. These electron-induced radiation sources and the synchrotron radiation created during Beamline operations are shielded using a combination of bulk and supplemental shields to protect workers from radiation exposure. Additionally, there are approximately 50 area radiation monitors strategically located around the building to monitor for prompt radiation in their general areas. As more beamlines are constructed additional area radiation monitors will be installed. The area radiation monitors are supplemented by over 100 thermo-luminescent dosimeters placed around the interior and exterior of the facility.

During the normal operation of the NSLS-II accelerators, small quantities of the short-lived radioactive isotopes ( $^{11}\text{C}$  (radioactive half-life = 20.4 min),  $^{13}\text{N}$  (half-life = 10 min) and  $^{15}\text{O}$  (half-life = 2 min)) are produced inside the accelerator enclosure by photon-neutron reactions with air. The rate of radionuclide production and subsequent environmental losses is governed by the 3.0-GeV energy, 500-milli-amperes (mA) current in the Storage Ring and the top-off mode of accelerator operation. The short-lived gaseous radionuclides produced inside the enclosure reach a saturation point within an hour of operations and are released into the environment by fugitive or diffusive losses through small openings and through normal HVAC operations. In accordance with Chapter 40 of the Code of Federal Regulations (CFR), section 61.93 (40CFR61.93), paragraph (b)(4)(i), the NSLS-II Facility takes a graded approach to periodically ascertain that the dose from emissions remains below 0.1 mrem in any given year. Analysis of the gaseous production rates at 3.0 GeV, 500 mA of stored beam current and 5000 operating hours shows the maximum dosimetric impact at the BNL site boundary of 0.000381 mrem in the

year (see Table 5 for 2016 impact). The long-term plan calls for a total of 60 beamlines around the beam storage ring. Based upon this additional information, the impacts from the radiological impact are not anticipated to be significant.

Based upon BNL's NEPA review of the Agreement, our discussions with BNL attorneys and staff, and our review of the above SEQRA sections, it is our determination that the actions being taken under Agreement 110960 are appropriately categorized as Type II actions requiring no further action on the part of NYSERDA.